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UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration
Washington, D. C. 20250

July 1966
Letter No. 36

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FEB 1 1968

COMMUNICATIONS RECORDS

TELEPHONE ENGINEERING INFORMATION

These information letters are intended to provide a means for answering questions that arise in the field and to inform the field of new developments. They are not intended to be instructions nor to replace in any respect the approved channels for establishing requirements and procedures.

Common Mode Operation: Under an agreement between the Runestone Telephone Association (Minn. 540), the ITT Corporation, and REA, a field trial of Common Mode Operation was initiated in Cyrus, Minnesota last month. The central office equipment, still under warranty, was modified by the manufacturer and REA installed and connected transcom E-6 type repeaters. Reports to date indicate that CMO has performed up to full expectations while providing actual subscriber service.

REA National Conference: It has been planned to set aside one day in the REA National Conference being held in Washington, D. C. the week of August 15, 1966, to discuss the role of telephone engineering, design criteria, and equipment in conserving the use of copper and promoting high quality telephone service at the lowest possible cost. These engineering sessions will be conducted by REA staff specialists.

Improved Mobile Telephone System: The General Electric Improved Mobile Telephone System (IMTS) is presently on field trial at several REA borrowers' projects. The field trial period has been in progress for approximately four months. REA radio engineers will visit one of the projects in the near future to make a thorough evaluation of the equipment operation.

Microwave: TE & CM-930, Use of Point-to-Point Radio in Telephony, is currently being reissued for use in planning microwave systems for telephone application. The section contains information relating to the engineering and economics of microwave systems. The microwave path survey and propagation information formerly contained in TE & CM-930 is being incorporated in a new section to be issued in the near future.

Fuseless Station Protectors: A multiple fuseless station protector has recently been developed and tested by Cook Electric Company. It consists of a mounting and cover equipped with two to six fuseless station protectors. It meets REA Specification PE-42 and has been listed by Underwriters' Laboratories. REA needs field trial installations before it can be considered by the Technical Standards Committee. Borrowers that have applications for multiple installations of fuseless station protectors and are willing to try a few of these protectors are urged to so inform the REA Area Engineer or Field Engineer.

The AJR Electronics Corporation has developed its Type 300 fuseless station protector which utilizes the AEI Type 16 gas tube. Sales of this protector are being handled by Eugene Munsell & Co. The manufacturer claims it to be a "fail safe" gas tube device, and that it "... is designed to meet UL-497 and REA Specification PE-42 fire hazard requirements." A partial evaluation of this protector in its present form indicates it does not completely meet all our requirements, but corrective action is being taken. A field trial is planned on long loops in severe lightning damage areas.

Revised Listing of Orbit Amplifiers: Recent acoustical tests of the Orbit PA 239A telephone transmitting amplifier have shown that current production models do not produce gains of 10 db. as did the earlier models we tested. Action has been initiated to revise its effective transmission rating from 7 db. to 5 db. or 2.5 db. $(T+R)/2$. Action has been initiated to revise TE & CM-706 to reflect this reduced capability, and to develop a new source of supply.

Carrier Protection: Cook and Reliable both have gas tube protectors available for use in carrier protection on a trial basis. Both of these companies are using the Siemens-Halske Type A1-A230 gas tubes in standard mountings and are developing other models. Field trials of the Siemens-Halske gas tubes are now in progress in several locations. Additional field trial installations of gas tubes on carrier systems are desired by REA in systems in which maintenance of carbon blocks has been excessive.

Subscriber Carrier: Low cost subscriber carrier came into its own in 1965. Presently, there are four companies in this field: Superior, C. A. C., Anaconda, and Kellogg. Superior has two different systems - E. D. S. and Added-Main-Line (A.M.L.). A.M.L. is a one channel system which allows the use of the physical, is powered from the C. O., and has a limit of 18 KF due to the loading on the physical. At this time Superior has about 400 channels in service among the independent telephone companies throughout the country. There are three options to C.A.C.'s Add-A-Line - no standby, standby, and connection to key system. Anaconda has a six channel system which they will field test in August. Kellogg

has a 10 channel system called K-25 which they currently have under field test. EDS equipment was recently placed on the list of acceptable materials. Listing of C.A.C.'s Add-A-Line probably will be considered in August 1966.

A computer study is under way to determine the field of use for subscriber carrier. Preliminary information indicates that on a major upgrading to one party service, a \$500 one party carrier is more economical than physical reinforcement on loops of approximately eight miles. A \$300 carrier is economical on loops of approximately six miles. One reason these prove-in distances are so great is that when upgrading from eight party to one party with the available four channel system, physical reinforcement is required with the carrier. This is not true in upgrading to four party and consequently the prove-in distances are less.

Carrier Training: Using a system of E.D.S. supplied by Superior, the TSD carrier group recently conducted a course for 36 REA staff engineers. Another course using A.M.L. and Add-A-Line is planned for line and staff engineers to familiarize them with this type of subscriber carrier.

Trunk Carrier: Approval of Western Electric N-3 has been withheld because it did not meet voice frequency response requirements in our field trial evaluation. The installation has now been corrected and listing will be requested in August. The Lenkurt version of the N-3 is called the 46B, while the Lynch version is called the B475. It is planned to have a system of each installed on a field trial within the next 3 months. Collins is also coming out with their version and is calling it the CMX107. They plan to sell the CMX107 at a much lower cost than the W. E. N-3.

Trunk Carrier Multiplex Equipment: A new specification (PE-60) has been approved and issued for trunk carrier multiplex equipment for application on wire, radio or any combination of these facilities. This specification replaces Part I of REA Form 397d for trunk carrier equipment and paragraphs 2.04 through 2.047 of Part I of REA Form 397d for Point-to-Point Radio Equipment which covers multiplex equipment only. The effective date of this specification is October 1, 1966.

Noise Measurements: In the future, field engineers may be asked to make impulse noise measurements. This information will be used to study the need for any improvements which may be necessary in plant and equipment to meet requirements for data transmission.

Subscriber Loop V. F. Repeater: The Transcom Electronics low cost subscriber loop repeater "SLR 22-24 D66" is presently on field trial in an REA borrowers' telephone system in North Carolina. Seven units of this repeater were installed in April 1966 on a variety of subscriber loops of different gauge content and loop resistance. The results of the initial tests on these units and their subsequent operation on working subscriber loops indicate excellent performance. They have provided on a continuing basis, excellent transmission and trouble free service.

Buried Distribution Wires: A new design of buried distribution wires containing one, two, three and six pairs in 19 AWG, three and six pairs in 22 AWG, and six pairs in 24 AWG is now in production. Its design makes it suitable also for use as a buried service wire. The design consists of individually insulated conductors twisted into pairs or stranded into a star-quad configuration as an alternate design for the two-pair wire. An inner jacket of either low-density or high-density polyethylene is extruded over the conductors with a bronze shield helically applied over the inner jacket. An outer jacket of high-density polyethylene is extruded over the shield. This new design should provide improved electrical and physical characteristics, make possible a direct splice into the cable pairs, and provide adequate protection from gophers. The REA specification for this facility (PE-50) is now available.

Revision of TE & CM-620, Design and Construction of Figure 8 Distribution Wire: This section has been revised to reflect changes in available sizes of figure and distribution wire and to issue sag tables for the new sizes added. The 12 pair facilities have been deleted from our specifications and 22 gauge has been added in the 3 and 6 pair sizes. The 6 pair size may also be obtained in the 24 gauge size. Special emphasis has been given to the proper spiraling technique to prevent the spirals from migrating to the support at the pole.

Plastic Conduit: We have had numerous requests for information concerning plastic conduit for multiduct runs. We have had a field trial of multiduct plastic conduit in North Carolina. Another installation involving approximately 16,000 duct feet has been installed in northern Mississippi. Plastic conduit jobs are still on a field trial basis since we are trying to develop firm construction practices and cost data. We estimate that a six-way plastic duct system including manholes can be installed for approximately one-third of the cost of a conventional clay duct system. The only difference in this six-way plastic duct system compared to a conventional duct system is that the inside diameter of the duct would be 2" whereas conventional type ducts are in the neighborhood of 3" to 3½". However, the 2" ID duct would take cables up to 400 pair, 24 gauge, and if need be an additional duct or two can be installed and smaller cables could be pulled through instead of one larger one. This would also allow the deferment of the additional cost of the large cable when half the size of that cable might suffice for a period of time. Efforts are being made to locate field trial sites for plastic duct systems using a 2" ID duct. There are no material specifications on this duct to date, but close controls are being kept on raw materials and the finished product by working directly with the Dupont Company.

Revision of PE-23: REA Specification for Fully Color Coded, Polyethylene-Insulated, Double Polyethylene - Jacketed Telephone Cables for Direct Burial has been revised to allow the use of a copper-clad stainless steel shield as an alternate to the 0.010-inch copper shield. The new shield has a 0.002-inch layer of copper on either side of a 0.002-inch layer of stainless steel. This shield should provide adequate protection and adequate conductivity. The copper clad stainless steel shield should be specified in gopher areas instead of the 10 mil copper shield.

Revision of PE-38: REA Specification for Figure 8 Cable has been revised to incorporate several desirable changes. The capacitance and resistance unbalance tolerances have been tightened. A new, stranded support messenger of 3/16-inch extra high strength steel is to be used instead of the solid 0.148-inch steel support wire. A new paragraph allowing the use of positive identification of tip and ring conductors of each pair has been added. Sequential length marking is now being required. These changes are to be required in all cable furnished for REA projects bid or on orders placed by REA borrowers after April 1, 1966.

Revision of PE-28: REA Specification for Figure 8 Multipair Distribution Wire has been revised to incorporate several desirable changes. The capacitance and resistance unbalance tolerances have been tightened. All 12-pair wires have been deleted, while 3- and 6- pair wires in 22- and 24-gauge respectively, have been added. The pressurization testing of the wire will no longer be required. These changes are required in all wire furnished for REA projects bid or on orders placed by REA borrowers after April 1, 1966.

Loose Bonding Harness: Engineers have reported that vibration or inadequate construction have caused the bonding harnesses to become loose at the grounding connectors in buried plant terminal housings. It is hoped that this problem will be eliminated by using smaller and more positive grounding connectors in buried plant terminal housings to be manufactured and supplied under our newly revised specification PE-35. The large split bolt type connector is some times very difficult to completely tighten on the tails of the bonding harness. This problem can be substantially eliminated by pigtailing all the tails together before inserting them into the grounding connector and then tightening the screw of the connector properly. In addition to this, when the tails are inserted into the grounding connector, the ends should be bent around the connector. This would also retard them from becoming disassociated with the connector and losing the ground and the continuity of the shield. From the noise and the lightning protection standpoint the shield must be properly bonded and continuous. It is very important that shield continuity be maintained.

Conductors - 26 AWG: REA Cable specifications (PE-22 and PE-23) are being revised to allow the use of 26 AWG conductors in the 400, 600 and 900 pair sizes.

Insects and Rodent Damage to Terminal Housings: We receive reports of insects and rodents entering terminal housings and building nests and damaging the cable and conductor insulation. The following three ways, shown in order of preference, are most effective in preventing insects or mice and other rodents from entering the terminal housings:

1. Use of an insect repellent inside the ground line cover plate of the terminal housing. This insect repellent is called "Pedestal Sealer 100A", and may be purchased from the Thiokol Chemical Corporation, Trenton 7, New Jersey.
2. Place well tamped nut gravel at the base of the terminal housing inside the ground line cover plate.
3. Place fiberglass insulating material at the base of the pedestal inside the ground line cover plate.

Direct Burial Splice Enclosure: Since the inception of our buried plant program there has been a need for direct burial splice enclosure to replace the galvanized cast iron type. The galvanized cast iron splice cases, if properly installed, are adequate for direct burial applications. Outside Plant Engineers have been working with a number of manufacturers toward the development of a direct burial splice case which would hold air and exclude water. Such a splice case has finally been developed and is going into plant on a field trial basis. This particular splice case is to be used on an Iowa project which will be completely pressurized. After this field trial, we hope that this splice case may be made available for use on all REA projects. Depending on cable size and usage, the material cost of this particular splice case should range from \$17.00 to \$48.00.

Frost Damage to Buried Plant: Field reports have indicated that frost conditions have been causing problems with buried plant in some of the Northern areas of the country. In consideration of these problems, all future buried construction in northern areas should use prudent construction practices. If possible, all cable and wire should be placed on private right of way. If not available, cable and wire should be placed on public right of way as deep as possible to minimize frost problems. When wire and cable breaks are repaired, an insulating material (such as a treated plank) should be placed over the repaired wire or cable prior to backfilling. This will help prevent future breaks in the same place. Where pedestal heaving is a persistent problem, pole mounted pedestals may be used to advantage.

Moisture in Terminal Housings: Reports from borrowers have maintained that moisture is substantially reduced inside the terminal housing if the earth inside the ground line cover plate is built up higher than the earth surrounding the outside of the ground line cover plate. This apparently will reduce the entrance of moisture inside the housing by capillary action. We have not tested this method yet, but we have been told that it works and it seems an easy and economical answer to the moisture problem. Moisture inside buried plant terminal housings should never be a problem if sealed splicing connectors are used for connecting service wire drops in place of terminal blocks. The use of terminal blocks may be fine right after cutover with new plant, but as insects,

moisture and dust accumulate on the block's surface the plant can become noisy. Every effort should be made to make buried plant completely sealed.

Additions, Revisions, or New Sections to the Telephone Engineering and Construction Manual. Since the Symposia held last fall the following have been issued:

Add. 2 TE&CM-111, Cable Record	April 1966
Add. 1 TE&CM-116, Plant Engineering and Record System	March 1966
Memorandum Supplement - TE&CM-205, Preparation of an Area Coverage Design	May 1966
Add. 1 TE&CM-212, Ringing Systems	April 1966
Rev. TE&CM-620, Design & Construction of Figure 8 Distribution Wire	May 1966
Rev. TE&CM-225, Bell System Traffic Agreement	April 1966
Rev. TE&CM-930, Use of Point-to-Point Radio in Telephony	June 1966
Rev. TE&CM-141, Fire Alarm Service (Community Dial System)	June 1966
Rev. TE&CM-221, Assignment of Line & Station Numbers (terminals per station system)	June 1966
New Section TE&CM-525, Telephone Traffic Dial Common Control System Equipment Quantities	July 1966
New Section, TE&CM-945, IMTS - Improved Mobile Telephone System	July 1966

